

FOR OIL TYPE TRANSFORMERS BUCH HOLZ RELAYS

APPLICATION

Buchholz Relay is a protection device for monitoring the gas and oil movements in oil immersed transformers.

It is designed to detect the faults and minimize the propagation of any damage which might occur within oil circuit, induction coils etc.

The examples of the faults which could cause gas accumulation or strong oil flows in the oil circuit are as follows;

Short-circuited core laminations

Broken-down core insulation

Overheating of windings

Bad contacts

Short-circuit between phases

Earth faults

Puncture of bushing insulators inside tank

Falling of oil level due to leaks

Ingress of air as a result of defective oil circulation system

CONSTRUCTION

ELMEK relays structurally consist of two main sections, i.e., main housing and upper housing which are both made of corrosion-resistant aluminum alloy and covered with electrostatic powder paint. These sections are also resin treated to seal possible micro pores.

Main Housing

Depending on the model, screw or flange type connections are available.

On each side, there are graduated inspection glass windows which enable the volume of gas to be read off and the contact system to be examined. The inspection windows have also additional metal protection covers against external hazards.

Upper Housing

Upper housing holds all the inside mechanisms and also fitted with a cable terminal box, a breather cock and a test button for the mechanical release of the floats to test the alarm circuits.

Cable terminal box incorporates the base mounted electrical connection parts and earth terminal, and has a cover for external hazard protection.

Breather cock is generally used to exhaust the air in the relay and to take out gas samples.

The inside mechanism comprises upper and lower contact systems for alarm and tripping positions.

Both contact systems includes;

-a float made of oil resistant, closed cellular type special plastic foam

-a magnet and a mechanical or mercury contact

Additionally, lower contact system is also fitted with a deflector plate for oil flow sensing.

Single float Buchholz relay has only one contact system together with the deflector plate.

OPERATION PRINCIPLE

During normal operation, the relay is completely filled with oil keeping the floats in their top limit or rest position.

The contact mechanisms in the relays respond to;

- slight faults causing a slow evolution of gas in the transformer,
- serious faults creating immediate oil surge,
- Oil leakages.

Slight Faults

When a slight or incipient fault occurs in the transformer, the small bubbles of gas, which pass upwards towards the oil conservator tank, are trapped in relay housing, thus causing its oil level to fall.

As a result, the upper float rotates on its hinge and operates the alarm switch, thus operating an external alarm device.

Serious Faults

When a serious fault, core insulation break-down, short circuits etc., occurs in the transformer, the gas generation is violent and causes the oil rush through the Buchholz Relay to the oil conservator tank.

In the relay, this oil surge impinges on the deflector plate fitted on the lower float and causes the rotation of the float itself, thus operating the tripping contact and disconnecting the transformer.

Oil Leakage

An oil leak in the transformer causes the oil level in the relay to fall, thus operating first the alarm (upper) float and then the tripping (lower) float.

The ingress of air into the transformer, arising from the defects in the oil circulation system operates the alarm float.

FINAL TESTS

The following tests are applied to the relays (100%) at the end of the production line;

Leakage test

The relays are filled with oil at the temperature of 90°C and at the pressure of ... bars and checked for the leakage after min. 30 minutes.

Electrical test

Earthing insulation of the connections is checked at the voltage of 2000V, 50Hz for 1 minute.

Functional test

All the relays are tested on specially designed PLC controlled testing unit and all the response conditions of the contact systems are checked.

ASSEMBLY INSTRUCTIONS

The following conditions should be verified for the best results;

- On the relay, there is an arrow showing the direction of the assembly (from the transformer to the oil conservator tank)
- The relay should always be full of oil. Therefore, the minimum oil level in the conservator should always be above the breather cock of the relay.
- The relay should be assembled horizontally to ensure correct operation of the floats. A maximum inclination of 4 ° with respect to the horizontal axis towards the conservator tank is allowed.
- The pipe which connects the transformer to the relay should come out from the uppermost part of the transformer cover.